



1
00:00:38,730 --> 00:00:11,270

[Music]

2
00:00:38,740 --> 00:00:46,860

t-minus one minute

3
00:01:21,880 --> 00:00:54,990

[Music]

4
00:01:21,890 --> 00:01:27,910

we are go for launch

5
00:01:27,920 --> 00:01:37,880

t-minus ten nine

6
00:01:43,010 --> 00:01:40,330

one

7
00:02:26,590 --> 00:01:43,020

services program hanger AE which is the

8
00:02:31,120 --> 00:02:28,960

hello and welcome to NASA's virtual

9
00:02:33,610 --> 00:02:31,130

social we are here in front of the

10
00:02:36,610 --> 00:02:33,620

beautiful the iconic Atlantic Atlantis

11
00:02:39,670 --> 00:02:36,620

space space shuttle and I'm here joined

12
00:02:41,710 --> 00:02:39,680

with Madison so great to be here with

13
00:02:43,870 --> 00:02:41,720

you Phillips oh I'm I'm Madison Tuttle

14

00:02:45,940 --> 00:02:43,880

and I am the social media lead here at

15

00:02:47,680 --> 00:02:45,950

Kennedy Space Center I just want to

16

00:02:49,510 --> 00:02:47,690

remind y'all while you're watching if

17

00:02:51,070 --> 00:02:49,520

you have any questions for a subject

18

00:02:53,320 --> 00:02:51,080

matter expert that's going to be joining

19

00:02:56,560 --> 00:02:53,330

us later feel free to drop them in the

20

00:02:59,020 --> 00:02:56,570

chat below so today we have a very

21

00:03:01,300 --> 00:02:59,030

special guest with us and he'll be

22

00:03:03,460 --> 00:03:01,310

talking about hangar AE which is a

23

00:03:05,440 --> 00:03:03,470

facility operated by the launch services

24

00:03:08,680 --> 00:03:05,450

program so the launch services program

25

00:03:11,140 --> 00:03:08,690

or LSP for short kind of serves as the

26
00:03:13,450 --> 00:03:11,150
earth bridge to space so anytime there's

27
00:03:15,820 --> 00:03:13,460
a robotic or scientific mission that

28
00:03:17,620 --> 00:03:15,830
needs to get into space LSP is there to

29
00:03:20,410 --> 00:03:17,630
make sure that that mission has the

30
00:03:22,600 --> 00:03:20,420
right rocket so Phillip I know that you

31
00:03:23,740 --> 00:03:22,610
work with the launch services program do

32
00:03:24,490 --> 00:03:23,750
you gonna tell us a little bit about

33
00:03:26,740 --> 00:03:24,500
what you do

34
00:03:28,270 --> 00:03:26,750
sure so thank you so much for the the

35
00:03:30,310 --> 00:03:28,280
great intro to LSP that was a great

36
00:03:32,650 --> 00:03:30,320
description of what we do so my job

37
00:03:34,780 --> 00:03:32,660
specifically is that I am a trajectory

38
00:03:37,210 --> 00:03:34,790

analyst and what that means is that I

39

00:03:39,490 --> 00:03:37,220

work with the commercial launch vehicle

40

00:03:41,200 --> 00:03:39,500

provider and the NASA spacecraft

41

00:03:42,820 --> 00:03:41,210

provider the people who build those

42

00:03:45,160 --> 00:03:42,830

robotic you know things like the Mars

43

00:03:47,170 --> 00:03:45,170

rovers are Earth orbiting satellites and

44

00:03:48,700 --> 00:03:47,180

things like that and we make sure that

45

00:03:50,350 --> 00:03:48,710

the rocket puts the spacecraft where

46

00:03:52,270 --> 00:03:50,360

it's supposed to go at the right time

47

00:03:54,250 --> 00:03:52,280

going the right direction and going the

48

00:03:55,600 --> 00:03:54,260

right speed so that's it's a lot of math

49

00:03:57,820 --> 00:03:55,610

but it's obviously the important things

50

00:03:59,470 --> 00:03:57,830

to make sure that it the things go the

51
00:04:01,960 --> 00:03:59,480
way that they're supposed to go so my

52
00:04:03,820 --> 00:04:01,970
job is basically all before launch we

53
00:04:05,530 --> 00:04:03,830
get you know we plan out the

54
00:04:07,450 --> 00:04:05,540
trajectories and we send the data out to

55
00:04:09,400 --> 00:04:07,460
the people who need it and we're gonna

56
00:04:11,500 --> 00:04:09,410
be doing that planning but today's

57
00:04:12,970 --> 00:04:11,510
conversation topic is going to be about

58
00:04:15,010 --> 00:04:12,980
what actually happens on the day of

59
00:04:16,479 --> 00:04:15,020
launch the people who are tracking the

60
00:04:18,460 --> 00:04:16,489
vehicle to make sure that it follows the

61
00:04:20,050 --> 00:04:18,470
trajectory that we planned out so we

62
00:04:21,820 --> 00:04:20,060
actually have a video for y'all to watch

63
00:04:28,350 --> 00:04:21,830

about hangar AE and then we'll be back

64

00:04:33,220 --> 00:04:30,940

our next stop is NASA's launch services

65

00:04:35,020 --> 00:04:33,230

program hangar 88 here at Cape Canaveral

66

00:04:36,460 --> 00:04:35,030

Air Force Station we're gonna head to

67

00:04:38,170 --> 00:04:36,470

the lobby to learn a little bit more

68

00:04:44,530 --> 00:04:38,180

about the capabilities hangar 80

69

00:04:46,240 --> 00:04:44,540

provides launch services program or LSP

70

00:04:48,250 --> 00:04:46,250

for short is responsible for launching

71

00:04:50,050 --> 00:04:48,260

NASA's uncrewed science and robotic

72

00:04:51,580 --> 00:04:50,060

missions but their expertise is

73

00:04:54,550 --> 00:04:51,590

invaluable to the Commercial Crew

74

00:04:56,320 --> 00:04:54,560

program in collaboration with our CCP

75

00:04:59,100 --> 00:04:56,330

colleagues we were working as one NASA

76
00:05:01,570 --> 00:04:59,110
to get humans back to space from KSC

77
00:05:03,700 --> 00:05:01,580
LSP shares their technical insight of

78
00:05:05,890 --> 00:05:03,710
the Falcon 9 and Atlas 5 launch vehicles

79
00:05:07,750 --> 00:05:05,900
performs launch vehicle engineering and

80
00:05:09,640 --> 00:05:07,760
analytical assessments and provides

81
00:05:11,530 --> 00:05:09,650
operations in-state for launch sites as

82
00:05:14,500 --> 00:05:11,540
well as at the launch vehicle provider

83
00:05:17,080 --> 00:05:14,510
design and production facilities inside

84
00:05:19,210 --> 00:05:17,090
hangar 80 on launch day LSP engineers

85
00:05:21,580 --> 00:05:19,220
and analysts are also on console working

86
00:05:23,980 --> 00:05:21,590
alongside the CCP technical launch team

87
00:05:26,680 --> 00:05:23,990
to provide real-time Falcon 9 technical

88
00:05:28,570 --> 00:05:26,690

advice when requested here at hangar AE

89

00:05:30,700 --> 00:05:28,580

LSP a-- has hosted pre-launch

90

00:05:32,230 --> 00:05:30,710

simulations for the demo2 mission and

91

00:05:34,690 --> 00:05:32,240

will also provide their world-class

92

00:05:38,970 --> 00:05:34,700

telemetry and communication services to

93

00:05:46,470 --> 00:05:43,950

sighs a lot here at you know every women

94

00:05:47,820 --> 00:05:46,480

communication hey Yuri can you tell me a

95

00:05:50,340 --> 00:05:47,830

little bit more about what you do

96

00:05:52,560 --> 00:05:50,350

yes Madison welcome so welcome to hangar

97

00:05:55,200 --> 00:05:52,570

18 so communications in telemetry so

98

00:05:56,640 --> 00:05:55,210

telemetry is getting data back from the

99

00:05:59,660 --> 00:05:56,650

rocket as it lifts off

100

00:06:02,610 --> 00:05:59,670

so there's tracking all along the earth

101
00:06:05,070 --> 00:06:02,620
for demo too and we get all that data

102
00:06:06,120 --> 00:06:05,080
back here to the engineering teams here

103
00:06:08,880 --> 00:06:06,130
at KSC

104
00:06:10,800 --> 00:06:08,890
so the communications obviously the

105
00:06:12,960 --> 00:06:10,810
launch team needs to communicate so they

106
00:06:15,270 --> 00:06:12,970
communicate at Hawthorne the communicate

107
00:06:16,890 --> 00:06:15,280
here at the hangar and at JSC to make

108
00:06:18,750 --> 00:06:16,900
sure that we're all ready for launch the

109
00:06:20,250 --> 00:06:18,760
whole team so let me give you a tour of

110
00:06:25,710 --> 00:06:20,260
the hangar and kind of go through the

111
00:06:28,460 --> 00:06:25,720
systems and how we do our job so hangar

112
00:06:31,290 --> 00:06:28,470
18 has been here since the 50s

113
00:06:34,500 --> 00:06:31,300

all launches so every single launch that

114

00:06:38,180 --> 00:06:34,510

launches on the US soil launches and

115

00:06:42,990 --> 00:06:38,190

gets the data from here so here it is

116

00:06:45,950 --> 00:06:43,000

launch services programs mission is to

117

00:06:49,230 --> 00:06:45,960

unite customers which in this case is

118

00:06:50,910 --> 00:06:49,240

CCP and capabilities and cultures to

119

00:06:53,040 --> 00:06:50,920

explore space through unparalleled

120

00:06:55,440 --> 00:06:53,050

launch services so the hangar East

121

00:06:58,110 --> 00:06:55,450

capability is one of the things that

122

00:07:03,390 --> 00:06:58,120

we're bringing to help demo to to help

123

00:07:06,060 --> 00:07:03,400

CCP and SpaceX get to the ISS so come on

124

00:07:07,680 --> 00:07:06,070

we have a few control rooms here the

125

00:07:09,840 --> 00:07:07,690

first one is the mission directors

126

00:07:11,640 --> 00:07:09,850

Center so you've seen this on many

127

00:07:14,490 --> 00:07:11,650

launches if you've watched launches in

128

00:07:16,920 --> 00:07:14,500

the past we've had a few updates in the

129

00:07:19,140 --> 00:07:16,930

last few years to make it much more

130

00:07:21,630 --> 00:07:19,150

sleek a much more open design here on

131

00:07:23,910 --> 00:07:21,640

the consoles so for a typical mission

132

00:07:26,430 --> 00:07:23,920

the engineering team will come in about

133

00:07:28,590 --> 00:07:26,440

six hours before launch and this is what

134

00:07:31,110 --> 00:07:28,600

they're seeing so on console they have

135

00:07:32,850 --> 00:07:31,120

three basic functions they have voice so

136

00:07:35,100 --> 00:07:32,860

that's communicating with 13

137

00:07:38,040 --> 00:07:35,110

that's what right here all these green

138

00:07:39,930 --> 00:07:38,050

boxes and so they pick all the nets that

139

00:07:41,400 --> 00:07:39,940

they want to hear so yellow is meaning

140

00:07:45,210 --> 00:07:41,410

that they're hearing

141

00:07:47,430 --> 00:07:45,220

someone talking on avionics net or GNC

142

00:07:50,130 --> 00:07:47,440

mentor countdown them then they have

143

00:07:51,750 --> 00:07:50,140

video obviously you want to see what's

144

00:07:53,100 --> 00:07:51,760

going on on the launch all the different

145

00:07:54,930 --> 00:07:53,110

valve making sure that they move

146

00:07:57,450 --> 00:07:54,940

correctly and then last so that I don't

147

00:07:59,730 --> 00:07:57,460

have up right now is the data so the

148

00:08:01,560 --> 00:07:59,740

data is what whatever system you're in

149

00:08:03,360 --> 00:08:01,570

charge of let's say propulsion they're

150

00:08:05,220 --> 00:08:03,370

seeing all the propulsion elements of

151

00:08:07,350 --> 00:08:05,230

that vehicle making sure that it's

152

00:08:10,590 --> 00:08:07,360

fueling correctly making sure that the

153

00:08:12,090 --> 00:08:10,600

engines are gimble incorrectly and so

154

00:08:14,430 --> 00:08:12,100

that's what you're doing on console

155

00:08:17,490 --> 00:08:14,440

those are the three basic functions here

156

00:08:19,950 --> 00:08:17,500

in the hangar and at every console at

157

00:08:22,410 --> 00:08:19,960

Hawthorn or at JSC that they're watching

158

00:08:25,080 --> 00:08:22,420

for is the video the voice and the data

159

00:08:26,820 --> 00:08:25,090

and so that is my team and my job here

160

00:08:28,740 --> 00:08:26,830

at hangar at E is to make sure that they

161

00:08:30,510 --> 00:08:28,750

get their comm make sure they get their

162

00:08:32,400 --> 00:08:30,520

video and make sure they get the data

163

00:08:35,730 --> 00:08:32,410

that they can use that they can make

164

00:08:39,029 --> 00:08:35,740

sure that they are go for launch so this

165

00:08:42,180 --> 00:08:39,039

is the MDC the CCP team will sit here

166

00:08:45,450 --> 00:08:42,190

during demo two and then for LSP

167

00:08:48,780 --> 00:08:45,460

launches management and all the

168

00:08:53,130 --> 00:08:48,790

executives sit in the MVC so we'll go

169

00:08:56,940 --> 00:08:53,140

into the other rooms right now and we'll

170

00:08:59,040 --> 00:08:56,950

show you what they do so here is the the

171

00:09:01,290 --> 00:08:59,050

back of the hangar back of the hangar is

172

00:09:03,540 --> 00:09:01,300

the launch vehicle data centers so

173

00:09:05,879 --> 00:09:03,550

that's really where the meat of the

174

00:09:07,739 --> 00:09:05,889

engineering team and the data gets

175

00:09:10,439 --> 00:09:07,749

I wanted to show you this door really

176

00:09:12,569 --> 00:09:10,449

fast so this door used to be the door of

177

00:09:14,699 --> 00:09:12,579

the mission directors Center we put

178

00:09:17,189 --> 00:09:14,709

every sticker that the hangar at a team

179

00:09:20,129 --> 00:09:17,199

has supported over the years again from

180

00:09:22,199 --> 00:09:20,139

since the 50s and so obviously you fill

181

00:09:23,789 --> 00:09:22,209

up the front of the door and say you've

182

00:09:26,039 --> 00:09:23,799

got a you got to use the back of the

183

00:09:28,470 --> 00:09:26,049

door so one of the first missions that I

184

00:09:30,499 --> 00:09:28,480

worked as a communications engineer was

185

00:09:33,389 --> 00:09:30,509

the Mars Science Laboratory Curiosity

186

00:09:36,989 --> 00:09:33,399

and then obviously we keep going

187

00:09:39,210 --> 00:09:36,999

launching LSP launches six missions in

188

00:09:43,439 --> 00:09:39,220

the last year or two so we're really

189

00:09:46,349 --> 00:09:43,449

busy one of the coolest things about the

190

00:09:49,169 --> 00:09:46,359

here is that we work every launch

191

00:09:50,549 --> 00:09:49,179

because we need the data to analyze that

192

00:09:54,090 --> 00:09:50,559

the launch that were working at the time

193

00:09:56,509 --> 00:09:54,100

is ready so for example StarLink

194

00:09:59,759 --> 00:09:56,519

SpaceX's last launch before demo ii

195

00:10:03,269 --> 00:09:59,769

launched a few weeks ago so we get that

196

00:10:06,090 --> 00:10:03,279

data back to the hangar and that data we

197

00:10:09,809 --> 00:10:06,100

can lay the measurements of that launch

198

00:10:13,609 --> 00:10:09,819

on top of demo two's launch that we

199

00:10:16,619 --> 00:10:13,619

verified that that's successful launch

200

00:10:18,989 --> 00:10:16,629

that has this type of pressure it's the

201
00:10:22,019 --> 00:10:18,999
same for demo too so that gives us an

202
00:10:24,210 --> 00:10:22,029
extra assurance that that our launch is

203
00:10:26,850 --> 00:10:24,220
going to be successful so that's what

204
00:10:32,340 --> 00:10:26,860
this team is doing in here

205
00:10:35,610 --> 00:10:32,350
and this is lvdc one so this is lvdc 2

206
00:10:38,400 --> 00:10:35,620
so this is where the LSP the launch

207
00:10:41,820 --> 00:10:38,410
services program senses so we are gonna

208
00:10:45,090 --> 00:10:41,830
help CCP launch with all of our 20 years

209
00:10:47,820 --> 00:10:45,100
of experience in SpaceX aim and other

210
00:10:50,220 --> 00:10:47,830
launch vehicle providers and you can see

211
00:10:52,710 --> 00:10:50,230
all the patches that LSP has worked over

212
00:10:55,500 --> 00:10:52,720
the years these show that our

213
00:10:58,410 --> 00:10:55,510

engineering team has tons of experiences

214

00:11:01,650 --> 00:10:58,420

so we're going to help CCP by having a

215

00:11:04,230 --> 00:11:01,660

team in here during demo 2 and they'll

216

00:11:06,570 --> 00:11:04,240

give them insight and oversight to make

217

00:11:09,390 --> 00:11:06,580

sure that the SpaceX Falcon 9 is ready

218

00:11:14,160 --> 00:11:09,400

to launch for demo - so this is Ellie DC

219

00:11:16,620 --> 00:11:14,170

- hangar has supported launch vehicle

220

00:11:19,560 --> 00:11:16,630

providers in this room if you watched

221

00:11:22,380 --> 00:11:19,570

icon launch in October the launch

222

00:11:25,380 --> 00:11:22,390

vehicle team Norfolk Grumman actually

223

00:11:28,380 --> 00:11:25,390

sat in here to launch the Pegasus and so

224

00:11:29,830 --> 00:11:28,390

for demo to the CCP team will sit in

225

00:11:34,030 --> 00:11:29,840

here

226

00:11:36,460 --> 00:11:34,040

and also LBC one and in the MVC so

227

00:11:38,470 --> 00:11:36,470

that's no we're helping support demo to

228

00:11:40,060 --> 00:11:38,480

hearing the hangar is we're gonna be

229

00:11:42,130 --> 00:11:40,070

getting data we're going to have

230

00:11:44,620 --> 00:11:42,140

engineers sitting on console looking at

231

00:11:48,280 --> 00:11:44,630

the telemetry verifying that the rocket

232

00:11:51,070 --> 00:11:48,290

is ready to launch and giving a go for

233

00:11:54,880 --> 00:11:51,080

NASA so thank you for coming to hangar

234

00:12:04,900 --> 00:11:54,890

at ye joy being involved in this mission

235

00:12:06,490 --> 00:12:04,910

and hangar E is is go floor alright so

236

00:12:08,740 --> 00:12:06,500

we're back and we're very lucky to have

237

00:12:10,540 --> 00:12:08,750

our special guests to read with us read

238

00:12:12,280 --> 00:12:10,550

can you tell us a little bit about sort

239

00:12:14,920 --> 00:12:12,290

of your role what your day-to-day looks

240

00:12:16,270 --> 00:12:14,930

like and maybe how hangar AE is involved

241

00:12:17,530 --> 00:12:16,280

in the demo to launch that's coming up

242

00:12:20,650 --> 00:12:17,540

sure yeah

243

00:12:23,460 --> 00:12:20,660

so I'm read the birdie so I am the chief

244

00:12:25,780 --> 00:12:23,470

of hangar AE the common telemetry team I

245

00:12:27,910 --> 00:12:25,790

started at NASA about ten years ago

246

00:12:30,220 --> 00:12:27,920

starting as a communications engineer

247

00:12:31,780 --> 00:12:30,230

then I moved up to be a lead and now I'm

248

00:12:34,360 --> 00:12:31,790

the branch chief of that group that

249

00:12:36,640 --> 00:12:34,370

group is about 40 engineers kind of in

250

00:12:38,770 --> 00:12:36,650

the background working these launches

251
00:12:41,020 --> 00:12:38,780
every launch and then for demo two we'll

252
00:12:42,580 --> 00:12:41,030
be working that making sure that all

253
00:12:44,910 --> 00:12:42,590
those systems are running making sure

254
00:12:48,130 --> 00:12:44,920
we're getting all the data so the launch

255
00:12:50,110 --> 00:12:48,140
services program can look at the data

256
00:12:53,830 --> 00:12:50,120
and make sure that LSP is ready for

257
00:12:57,250 --> 00:12:53,840
launch so perfect and Reid you took us

258
00:12:58,780 --> 00:12:57,260
on a great to of tour of hangar AES so

259
00:12:59,770 --> 00:12:58,790
can you tell us what's his eight you

260
00:13:03,100 --> 00:12:59,780
stand for

261
00:13:05,650 --> 00:13:03,110
so AE is on the Cape Canaveral Air Force

262
00:13:07,600 --> 00:13:05,660
Station side so they named their

263
00:13:10,360 --> 00:13:07,610

buildings after letters so it starts

264

00:13:13,690 --> 00:13:10,370

with building a and goes up so a II was

265

00:13:16,210 --> 00:13:13,700

the next one in that sequence so kind of

266

00:13:17,920 --> 00:13:16,220

boring but at least not an acronym you

267

00:13:18,950 --> 00:13:17,930

know the mass is usually using acronyms

268

00:13:21,830 --> 00:13:18,960

so right

269

00:13:25,850 --> 00:13:21,840

and how many people total works over in

270

00:13:27,500 --> 00:13:25,860

hangar eight so yeah about 40 people and

271

00:13:29,180 --> 00:13:27,510

then obviously we have all people

272

00:13:31,850 --> 00:13:29,190

working admin parts too so there's

273

00:13:33,980 --> 00:13:31,860

another 20 working SharePoint and other

274

00:13:35,830 --> 00:13:33,990

administrative tools and then actually

275

00:13:39,380 --> 00:13:35,840

we have a sister site out of Vandenberg

276

00:13:41,750 --> 00:13:39,390

building 836 that has another 20 people

277

00:13:45,980 --> 00:13:41,760

and that supports the LSP missions that

278

00:13:48,710 --> 00:13:45,990

launched out of California and and so if

279

00:13:51,290 --> 00:13:48,720

you happen to have a launch maybe close

280

00:13:54,110 --> 00:13:51,300

to each other on back-to-back days how

281

00:13:55,430 --> 00:13:54,120

do you staff that or support that yeah

282

00:13:58,070 --> 00:13:55,440

so that's the cool thing about the

283

00:14:00,500 --> 00:13:58,080

hangar we can support many different

284

00:14:03,170 --> 00:14:00,510

telemetry streams all simultaneously we

285

00:14:04,850 --> 00:14:03,180

can actually support up to five launches

286

00:14:06,500 --> 00:14:04,860

kind of on the same at the same time

287

00:14:08,390 --> 00:14:06,510

obviously it's they're not always

288

00:14:11,210 --> 00:14:08,400

launching they're always it's as soon as

289

00:14:13,040 --> 00:14:11,220

they power up we get the telemetry so

290

00:14:14,330 --> 00:14:13,050

before they they launch we're getting

291

00:14:15,620 --> 00:14:14,340

the telemetry so there's some times

292

00:14:17,510 --> 00:14:15,630

where we're supporting a Vandenberg

293

00:14:19,850 --> 00:14:17,520

mission kind of getting their systems

294

00:14:22,490 --> 00:14:19,860

figured out and also a demo two mission

295

00:14:24,050 --> 00:14:22,500

or any other missions kind of all at the

296

00:14:26,600 --> 00:14:24,060

same time so we're getting a lot of data

297

00:14:30,290 --> 00:14:26,610

sometimes multiple missions all at the

298

00:14:32,870 --> 00:14:30,300

same time which is cool yeah and why is

299

00:14:35,210 --> 00:14:32,880

it so important to be kind of monitoring

300

00:14:37,940 --> 00:14:35,220

and analyzing that data going into

301
00:14:40,820 --> 00:14:37,950
hangar 80 during a launch yeah so that's

302
00:14:43,490 --> 00:14:40,830
that's a good question so so the reason

303
00:14:46,460 --> 00:14:43,500
we exist at least in my in my view is we

304
00:14:49,400 --> 00:14:46,470
are an independent analysis of the

305
00:14:52,310 --> 00:14:49,410
vehicles status so what that means it's

306
00:14:54,290 --> 00:14:52,320
just in this set let's talk demo - so

307
00:14:56,750 --> 00:14:54,300
they have SpaceX has their own systems

308
00:14:59,260 --> 00:14:56,760
that created the rocket that gets the

309
00:15:01,810 --> 00:14:59,270
data so we can take that data

310
00:15:04,640 --> 00:15:01,820
independently from the way they did it

311
00:15:06,590 --> 00:15:04,650
decom it or take it apart in the

312
00:15:08,300 --> 00:15:06,600
measurements and then look at it

313
00:15:10,670 --> 00:15:08,310

independently of what they're looking at

314

00:15:14,150 --> 00:15:10,680

and that gives that extra assurance for

315

00:15:16,580 --> 00:15:14,160

astronauts far the unmanned payloads and

316

00:15:18,410 --> 00:15:16,590

then Ellis piece perspective that hey

317

00:15:20,390 --> 00:15:18,420

this this system is really ready to

318

00:15:21,870 --> 00:15:20,400

launch everything looks right and then

319

00:15:24,360 --> 00:15:21,880

we can say go for launch

320

00:15:26,220 --> 00:15:24,370

so read when you show us the things that

321

00:15:28,110 --> 00:15:26,230

we saw in that video you're in the lv

322

00:15:29,700 --> 00:15:28,120

dcs and it looks kind of like a mission

323

00:15:31,650 --> 00:15:29,710

control room that may be something that

324

00:15:33,300 --> 00:15:31,660

sort of piqued people's memories can you

325

00:15:35,220 --> 00:15:33,310

tell us how you know the telemetry

326

00:15:37,350 --> 00:15:35,230

center is a little different from the

327

00:15:39,660 --> 00:15:37,360

launch control center yeah so we don't

328

00:15:42,660 --> 00:15:39,670

actually launch the rocket from hangar

329

00:15:45,210 --> 00:15:42,670

AE a company can come in like a Northrop

330

00:15:46,620 --> 00:15:45,220

Grumman in the video they can launch the

331

00:15:48,600 --> 00:15:46,630

rocket of course they weren't launching

332

00:15:51,630 --> 00:15:48,610

it in a Pegasus perspective actually the

333

00:15:54,030 --> 00:15:51,640

pilot does but so but we're monitoring

334

00:15:55,440 --> 00:15:54,040

so when you say telemetry it's kind of

335

00:15:57,570 --> 00:15:55,450

like when you go to your doctor when

336

00:15:59,400 --> 00:15:57,580

you're getting a heart rate you get the

337

00:16:02,070 --> 00:15:59,410

telemetry of your heart rate so it's the

338

00:16:03,780 --> 00:16:02,080

same thing for a rocket the telemetry as

339

00:16:05,550 --> 00:16:03,790

you launch down you get all the

340

00:16:08,570 --> 00:16:05,560

different measure measurements and that

341

00:16:11,430 --> 00:16:08,580

could be a pressure a temperature a

342

00:16:13,860 --> 00:16:11,440

different gauge and then that will tell

343

00:16:16,080 --> 00:16:13,870

you hey the Rockets working properly and

344

00:16:18,120 --> 00:16:16,090

we decon that put that into engineering

345

00:16:20,310 --> 00:16:18,130

units and then the engineers put put

346

00:16:22,170 --> 00:16:20,320

together pages so that they can view

347

00:16:24,240 --> 00:16:22,180

whatever temperature they want to see or

348

00:16:26,370 --> 00:16:24,250

anything that they're looking at so how

349

00:16:28,080 --> 00:16:26,380

much effort does it take beforehand to

350

00:16:31,380 --> 00:16:28,090

make sure that you can do all of those

351
00:16:32,880 --> 00:16:31,390
things in the moment and be able to you

352
00:16:34,110 --> 00:16:32,890
know if an anomaly happens or anything

353
00:16:35,520 --> 00:16:34,120
like that to be able to be prepared

354
00:16:38,550 --> 00:16:35,530
because it's all happening real-time

355
00:16:40,740 --> 00:16:38,560
right right yeah so for demo two I mean

356
00:16:43,110 --> 00:16:40,750
really demo one was the beginning of us

357
00:16:46,410 --> 00:16:43,120
testing these systems for this launch

358
00:16:47,490 --> 00:16:46,420
and working with the our customers to

359
00:16:49,380 --> 00:16:47,500
make sure that we gather all the

360
00:16:51,810 --> 00:16:49,390
requirements we meet with them

361
00:16:54,270 --> 00:16:51,820
constantly to make sure we update

362
00:16:56,670 --> 00:16:54,280
anything that they need so even

363
00:16:58,800 --> 00:16:56,680

yesterday I'm getting emails constantly

364

00:17:01,050 --> 00:16:58,810
with changes and fixes just little

365

00:17:03,480 --> 00:17:01,060
things at this point but yeah it's a

366

00:17:05,460 --> 00:17:03,490
constant like two years out you're

367

00:17:07,350 --> 00:17:05,470
meeting with your customer and in my

368

00:17:09,540 --> 00:17:07,360
perspective being people on the hanger

369

00:17:11,100 --> 00:17:09,550
AE to make sure that we get all the

370

00:17:12,510 --> 00:17:11,110
requirements that we need so it's a long

371

00:17:15,300 --> 00:17:12,520
process

372

00:17:18,270 --> 00:17:15,310
and what are the requirements for a

373

00:17:22,290 --> 00:17:18,280
launch to be good to go what are the

374

00:17:24,780 --> 00:17:22,300
requirements okay so obviously everybody

375

00:17:27,000 --> 00:17:24,790
has a role right so from a hanger

376

00:17:29,490 --> 00:17:27,010

perspective we have people that are

377

00:17:31,380 --> 00:17:29,500

working on a specific piece of the

378

00:17:32,880 --> 00:17:31,390

rocket so the propulsion so they're

379

00:17:36,270 --> 00:17:32,890

making sure that all the fuel is

380

00:17:37,950 --> 00:17:36,280

correctly is put in and and then

381

00:17:39,930 --> 00:17:37,960

obviously there's the launch directors

382

00:17:41,820 --> 00:17:39,940

and they're kind of making sure their

383

00:17:43,740 --> 00:17:41,830

team funnels up all the requirements

384

00:17:45,840 --> 00:17:43,750

making sure that every system is ready

385

00:17:47,430 --> 00:17:45,850

so my system is making sure that they

386

00:17:49,560 --> 00:17:47,440

can all communicate because some of the

387

00:17:50,970 --> 00:17:49,570

time and especially now they're all in

388

00:17:53,580 --> 00:17:50,980

different parts of the country they're

389

00:17:54,210 --> 00:17:53,590

in Hawthorne there in JSC and they're in

390

00:17:56,010 --> 00:17:54,220

hangar AE

391

00:17:57,840 --> 00:17:56,020

and so that's kind of the way it works

392

00:17:59,820 --> 00:17:57,850

is you funnel up all the different

393

00:18:02,220 --> 00:17:59,830

positions make sure that they're ready

394

00:18:05,610 --> 00:18:02,230

on their piece and then obviously at the

395

00:18:09,810 --> 00:18:05,620

end we tell SpaceX hey NASA is ready to

396

00:18:11,940 --> 00:18:09,820

go so so from my perspective as I said

397

00:18:14,730 --> 00:18:11,950

I'm a trajectory analyst so I'm really

398

00:18:16,410 --> 00:18:14,740

just thinking about t0 and after so the

399

00:18:17,640 --> 00:18:16,420

launch time and after so once you're

400

00:18:20,160 --> 00:18:17,650

tracking the vehicle when it's already

401

00:18:22,620 --> 00:18:20,170

in the air is it how is it different

402

00:18:24,360 --> 00:18:22,630

when you're tracking telemetry prior to

403

00:18:25,290 --> 00:18:24,370

launch because you don't start you know

404

00:18:26,700 --> 00:18:25,300

you don't just start doing your

405

00:18:28,980 --> 00:18:26,710

telemetry once it lifts off you're doing

406

00:18:30,990 --> 00:18:28,990

telemetry hours beforehand right yeah so

407

00:18:32,670 --> 00:18:31,000

there's the umbilical so you have it

408

00:18:35,130 --> 00:18:32,680

hooked up to the rocket so we get

409

00:18:37,680 --> 00:18:35,140

telemetry from there there's also ground

410

00:18:40,830 --> 00:18:37,690

stations here around Center tel floor

411

00:18:42,840 --> 00:18:40,840

that gets us the RF telemetry and then

412

00:18:45,180 --> 00:18:42,850

so that's what you get the pre-launch

413

00:18:47,670 --> 00:18:45,190

and then post launch it depends on the

414

00:18:50,190 --> 00:18:47,680

rocket so some launch vehicles like

415

00:18:53,400 --> 00:18:50,200

SpaceX look stock demo to again they use

416

00:18:56,100 --> 00:18:53,410

all ground assets for Falcon 9 I think

417

00:18:58,710 --> 00:18:56,110

the dragon actually uses t dress and

418

00:19:02,460 --> 00:18:58,720

then t dress is NASA's tracking

419

00:19:04,170 --> 00:19:02,470

satellites in space and so ula and some

420

00:19:05,940 --> 00:19:04,180

of the other launch vehicle varieties

421

00:19:09,120 --> 00:19:05,950

actually use t dress and we're actually

422

00:19:11,430 --> 00:19:09,130

kind of a hub here at KSC to get the t

423

00:19:13,290 --> 00:19:11,440

dress data back and teachers again are

424

00:19:15,840 --> 00:19:13,300

the satellites that track in space for

425

00:19:17,550 --> 00:19:15,850

nasa and that's run out of Goddard so we

426

00:19:21,840 --> 00:19:17,560

get that data also

427

00:19:23,450 --> 00:19:21,850

and do you experience any time delays

428

00:19:24,780 --> 00:19:23,460

and communication or is it pretty

429

00:19:27,090 --> 00:19:24,790

instantaneous

430

00:19:28,950 --> 00:19:27,100

yeah just like anything you know now

431

00:19:31,410 --> 00:19:28,960

it's all Ethernet so sometimes if

432

00:19:32,910 --> 00:19:31,420

someone they're using a lot of Ethernet

433

00:19:34,230 --> 00:19:32,920

sometimes that can be some delayed

434

00:19:36,720 --> 00:19:34,240

that's something we're constantly

435

00:19:39,750 --> 00:19:36,730

tracking to make sure that our delay is

436

00:19:42,750 --> 00:19:39,760

is working correctly because it can get

437

00:19:44,460 --> 00:19:42,760

really kind of confusing if someone

438

00:19:46,530 --> 00:19:44,470

right next to you is talking in a net

439

00:19:48,180 --> 00:19:46,540

that you're also listening to if there's

440

00:19:51,980 --> 00:19:48,190

delay so that's something where as a

441

00:19:54,960 --> 00:19:51,990

common generic constantly making sure

442

00:19:58,530 --> 00:19:54,970

that the communications as quickly and

443

00:19:59,970 --> 00:19:58,540

as as possible so maybe just kind of

444

00:20:01,170 --> 00:19:59,980

just take a step back we've used a lot

445

00:20:03,150 --> 00:20:01,180

of different terms throughout this

446

00:20:05,700 --> 00:20:03,160

discussion yeah you just kind of define

447

00:20:07,440 --> 00:20:05,710

telemetry what that really means I don't

448

00:20:09,990 --> 00:20:07,450

if you have any you know ways to relate

449

00:20:13,560 --> 00:20:10,000

it to common knowledge yeah so I kind of

450

00:20:16,110 --> 00:20:13,570

talked a little bit about that but yeah

451

00:20:17,820 --> 00:20:16,120

it's lemon tree is for the rocket right

452

00:20:21,330 --> 00:20:17,830

is again is you're getting all the

453

00:20:24,660 --> 00:20:21,340

different pieces back so that a launch

454

00:20:27,330 --> 00:20:24,670

vehicle engineer can look at it so at 11

455

00:20:30,390 --> 00:20:27,340

in my perspective the telemetry is all

456

00:20:32,400 --> 00:20:30,400

put together in one stream and then sent

457

00:20:34,500 --> 00:20:32,410

through t dress or a tracking satellite

458

00:20:37,770 --> 00:20:34,510

and then we D comment so what that means

459

00:20:39,900 --> 00:20:37,780

is like there's one stream packet of

460

00:20:42,660 --> 00:20:39,910

information and then you have to know

461

00:20:45,690 --> 00:20:42,670

where that temperature is within that

462

00:20:48,900 --> 00:20:45,700

stream and so there's a lot of math and

463

00:20:50,610 --> 00:20:48,910

a lot of figuring out how that piece is

464

00:20:52,530 --> 00:20:50,620

put together and you work with a lot of

465

00:20:55,080 --> 00:20:52,540

different launch vehicle providers which

466

00:20:57,750 --> 00:20:55,090

gives us that extra expertise in

467

00:20:59,910 --> 00:20:57,760

understanding how that would work on a

468

00:21:01,740 --> 00:20:59,920

standards basis so it's it's kind of

469

00:21:04,170 --> 00:21:01,750

good have different experiences

470

00:21:06,390 --> 00:21:04,180

different launch vehicles because the

471

00:21:07,590 --> 00:21:06,400

way that they all kind of are related

472

00:21:10,440 --> 00:21:07,600

and that they're doing the same thing

473

00:21:12,750 --> 00:21:10,450

and is do you have a sense of how much

474

00:21:14,130 --> 00:21:12,760

data that is you think about all the

475

00:21:15,720 --> 00:21:14,140

different things that the vehicles

476
00:21:17,460 --> 00:21:15,730
sending down to the ground yeah so one

477
00:21:19,350 --> 00:21:17,470
cool thing we did was it used to be

478
00:21:20,820 --> 00:21:19,360
stripped charts and just before I

479
00:21:23,220 --> 00:21:20,830
started they were kind of still using

480
00:21:24,810 --> 00:21:23,230
strip charts and it was you know not

481
00:21:27,269 --> 00:21:24,820
many measurements maybe 800

482
00:21:29,039 --> 00:21:27,279
- a thousand measurements now it's

483
00:21:31,710 --> 00:21:29,049
hundreds of thousands of measurements

484
00:21:33,990 --> 00:21:31,720
that SpaceX is sending down that we have

485
00:21:36,659 --> 00:21:34,000
to decom and obviously the processing

486
00:21:38,340 --> 00:21:36,669
power has to be much better so we have

487
00:21:40,470 --> 00:21:38,350
really big servers in the hangar that

488
00:21:42,960 --> 00:21:40,480

that helps kind of chug through all that

489

00:21:44,789 --> 00:21:42,970

data 20a you say 800 to a thousand is

490

00:21:46,590 --> 00:21:44,799

not that many so that gives a

491

00:21:50,249 --> 00:21:46,600

perspective on how things have changed

492

00:21:52,470 --> 00:21:50,259

right one last question from social

493

00:21:55,769 --> 00:21:52,480

media what's something you wish the

494

00:21:57,480 --> 00:21:55,779

general public knew more about either

495

00:22:02,610 --> 00:21:57,490

what you do or just during launches in

496

00:22:04,740 --> 00:22:02,620

general let's see general public I mean

497

00:22:09,360 --> 00:22:04,750

my view is you know there's always

498

00:22:11,610 --> 00:22:09,370

debate on commercial versus government

499

00:22:14,129 --> 00:22:11,620

and this is a good example a great

500

00:22:16,379 --> 00:22:14,139

example actually of that that we can do

501
00:22:18,389 --> 00:22:16,389
both you can do both you can have

502
00:22:21,119 --> 00:22:18,399
government oversight and helping

503
00:22:23,999 --> 00:22:21,129
commercial companies get what they want

504
00:22:26,999 --> 00:22:24,009
to do while also doing commercial and

505
00:22:30,360 --> 00:22:27,009
and LSP is a perfect example of that

506
00:22:32,159 --> 00:22:30,370
kind of meshing of hey we can help you

507
00:22:34,889 --> 00:22:32,169
get where you want to go as a commercial

508
00:22:36,690 --> 00:22:34,899
company but we are a government

509
00:22:39,720 --> 00:22:36,700
organization so we'll stay out of your

510
00:22:42,299 --> 00:22:39,730
way we'll make sure that you can be

511
00:22:46,619 --> 00:22:42,309
successful and we'll help pieces like

512
00:22:48,269 --> 00:22:46,629
hangar AE in a good sense of getting

513
00:22:51,840 --> 00:22:48,279

what they need to do so Northrop Grumman

514

00:22:54,419 --> 00:22:51,850

for example they're headquartered up in

515

00:22:55,740 --> 00:22:54,429

Maryland or Virginia I think and they

516

00:22:58,049 --> 00:22:55,750

don't have to point in presence here at

517

00:23:01,019 --> 00:22:58,059

KSC so they had nowhere to sit their

518

00:23:03,690 --> 00:23:01,029

team for their launches and so we

519

00:23:05,999 --> 00:23:03,700

provided that to them and it saved them

520

00:23:08,100 --> 00:23:06,009

you know a millions of dollars of trying

521

00:23:10,649 --> 00:23:08,110

to set up a whole comm system and

522

00:23:13,769 --> 00:23:10,659

telemetry system and so that's ways that

523

00:23:15,990 --> 00:23:13,779

we help commercial entities get where

524

00:23:18,070 --> 00:23:16,000

they want to go so that would be what I

525

00:23:21,130 --> 00:23:18,080

would kind of say to everyone

526

00:23:21,940 --> 00:23:21,140

great cool yeah I think that's that's it

527

00:23:23,950 --> 00:23:21,950

for now

528

00:23:25,870 --> 00:23:23,960

Reid thank you so much for joining us I

529

00:23:27,789 --> 00:23:25,880

really learned a lot you know it's

530

00:23:29,440 --> 00:23:27,799

working with LSP there's just so many

531

00:23:31,509 --> 00:23:29,450

things that you just it's it's a big

532

00:23:33,279 --> 00:23:31,519

program because launching rockets is a

533

00:23:34,840 --> 00:23:33,289

really big endeavor so it's awesome to

534

00:23:36,460 --> 00:23:34,850

learn more about other parts of the

535

00:23:38,710 --> 00:23:36,470

program so thank you for joining us hope

536

00:23:40,060 --> 00:23:38,720

you had a good time yeah I did Madison

537

00:23:41,620 --> 00:23:40,070

thank you so much for being a part of

538

00:23:42,970 --> 00:23:41,630

this as well and for forgetting our

539

00:23:44,380 --> 00:23:42,980

questions in and then thank you for

540

00:23:47,799 --> 00:23:44,390

everybody who sent in questions we

541

00:23:49,630 --> 00:23:47,809

really appreciate your commentary so the

542

00:23:52,090 --> 00:23:49,640

next show is going to be a three o'clock

543

00:23:53,950 --> 00:23:52,100

Eastern we'll be talking about spaceport